

(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property Organization  
International Bureau



(43) International Publication Date  
20 March 2003 (20.03.2003)

PCT

(10) International Publication Number  
**WO 03/023298 A1**

(51) International Patent Classification<sup>7</sup>: **F25D 23/02**

(74) Agents: **BAHNG, Hae, Cheol et al.**; Kims International Patent & Law Office, 15th Floor Yo Sam Building 648-23, Yeoksam-dong, Kangnam-gu, 135-080 Seoul (KR).

(21) International Application Number: **PCT/KR02/01480**

(22) International Filing Date: **5 August 2002 (05.08.2002)**

(81) Designated States (*national*): AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NO, NZ, OM, PH, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VN, YU, ZA, ZM, ZW.

(25) Filing Language: **English**

(26) Publication Language: **English**

(30) Priority Data:  
2001-55219 7 September 2001 (07.09.2001) **KR**

(84) Designated States (*regional*): ARIPO patent (GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE, SK, TR), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

(71) Applicant (*for all designated States except US*): **LG ELECTRONICS INC.** [KR/KR]; 20, Yoido-dong, Youngdungpo-gu, 150-721 Seoul (KR).

(72) Inventor; and

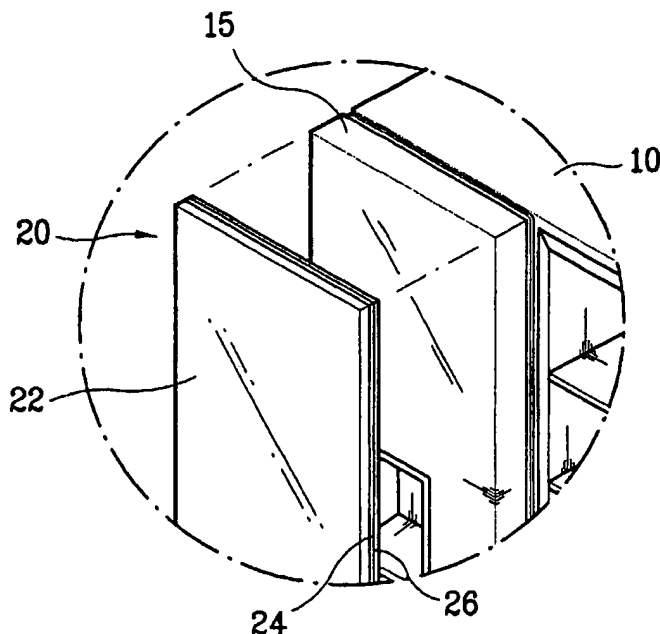
(75) Inventor/Applicant (*for US only*): **KOO, Ja Hun** [KR/KR]; Lucky APT. 1-1503, 8, Banlim-dong, Changwon-shi, 641-764 Kyongsangnam-do (KR).

Published:

— with international search report

[Continued on next page]

(54) Title: **EXTERNAL DECORATING MEMBER FOR REFRIGERATOR DOOR**



(57) Abstract: An external decorating member installed on the surface of a refrigerator is disclosed, in which the external decorating member 20 comprises a glass member 22, a first paint layer 24 formed on top of the glass member 22 and having reflecting materials for reflecting light which passed through the glass member, and a second paint layer 26 formed on top of the first paint layer 24 and having a certain color.

WO 03/023298 A1



---

*For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.*

- 1 -

**EXTERNAL DECORATING MEMBER FOR REFRIGERATOR DOOR**5    TECHNICAL FIELD

The present invention relates to a refrigerator, and more particularly, to an external decorating member for a refrigerator door.

10   PRIOR ART

Generally, a refrigerator generates the cool air using a refrigerating system mounted therein and supplies the cool air into a refrigerating chamber and a freezing chamber so as to freshly preserve the food stored in the  
15   refrigerating and freezing chambers for a long time. A general construction of a typical refrigerator will be described with reference to FIG. 1.

As shown in FIG. 1, the refrigerator includes a main body 1 provided with a refrigerating chamber 2 and a  
20   freezing chamber (not shown). The refrigerating chamber 2 having a plurality of shelves 3 for placing the food inside the chamber preserves the food at a low temperature by ventilating the cool air. The freezing chamber for preserving frozen food is separated from the refrigerating  
25   chamber 2 by a barrier (not shown). The freezing and refrigerating chambers may be positioned either up and down or side by side inside the main body 1.

The main body further includes doors 5 and 5' for opening and closing the refrigerating and freezing

- 2 -

chambers. The doors 5 and 5' have an outer case 5a made of steel and an inner case 5b made of synthetic resin. The outer case 5a is formed to externally decorate the refrigerator and the inner case 5b is formed to make some space between the outer case 5a and itself. The surface of the outer case 5a is covered with paint so that it is not exposed. Also, the space between the outer and inner cases 5a and 5b is filled with an insulator(not shown) to insulate the refrigerator 2. Each outer case 5a is provided with a door handle 5c on its surface so that the doors 5 and 5' are easily opened or closed.

The refrigerator doors of the prior art, however, have following' limitations. Because the doors 5 and 5' are formed on the front surfaces of the refrigerating chamber 2 and the freezing chamber respectively, the outer case 5a is directly exposed when the doors 5 and 5' are closed. That is, the paint coated on the surface of the outer case 5a is seen. However, because the doors 5 and 5' coated with the paint show only a simple color, the prior art refrigerator can not satisfy customers with their various tastes.

#### DISCLOSURE OF THE INVENTION

Accordingly, the present invention is directed to an external decorating member for a refrigerator door that substantially obviates one or more problems due to limitations and disadvantages of the prior art.

An object of the present invention is to provide a refrigerator with a more sophisticated and elegant

- 3 -

external appearance.

To achieve this object and other advantages and in accordance with the purpose of the invention, the refrigerator of the present invention includes a glass member, a first paint layer formed on top of the glass member and having a reflecting material for reflecting the light which passed through the glass member, and a second paint layer formed on top of the first paint layer and having a certain color.

10 The glass member is a plate member attached to the front surface of a refrigerator door and has the same size as the front surface of the same. Preferably, the glass member is made of tempered glass having an improved stiffness by being hardened by heat.

15 It is preferred that the first paint layer has its thickness in the range of 5-20 $\mu$ m and, more accurately, in the range of 10-15 $\mu$ m. The reflecting material of the first paint layer is made of an inorganic pigment or metal particles. The first paint layer is spontaneously dried at  
20 the normal temperature before the second pigment is dried.

Also, it is preferred that the second paint layer has its thickness in the range of 5-35 $\mu$ m and, more accurately, in the range of 10-30 $\mu$ m. The second paint layer is artificially dried by heat.

25 It is better for both the first and second paint layers to be made of a heat-resisting ceramic pigment. The second paint layer of the external decorating member is respectively provided to the doors 5 and 5' so that it comes in contact with the front surface of its

- 4 -

corresponding door.

As described above, the refrigerator of the present invention, on the surfaces of its doors 5 and 5', has the glass member coated with various colors and especially with a pigment having the reflecting material. Accordingly, the refrigerator of the present invention can satisfy consumers with their various tastes and thus the commercial value of the refrigerator also increases.

Additional advantages, objects, and features of the invention will be set forth in part in the description which follows and in part will become apparent to those having ordinary skill in the art upon examination of the following or may be learned from practice of the invention. The objectives and other advantages of the invention may be realized and attained by the structure particularly pointed out in the written description and claims hereof as well as the appended drawings.

It is to be understood that both the foregoing general description and the following detailed description are exemplary and explanatory and are intended to provide further explanation of the invention as claimed.

#### BRIEF DESCRIPTION OF THE DRAWINGS

The accompanying drawings, which are included to provide a further understanding of the invention and are incorporated in and constitute a part of this specification, illustrate embodiments of the invention and together with the description serve to explain the principles of the invention.

- 5 -

In the drawings:

FIG. 1 is a perspective view illustrating the construction of a refrigerator of the prior art;

FIG. 2 is a perspective view illustrating a refrigerator provided with an external decorating member in accordance with the present invention;

FIG. 3 is a fragmentary perspective view illustrating an external decorating member in accordance with the present invention;

FIG. 4 is a cross-sectional view taken along line I-I shown in FIG. 2 and illustrating a door with an external decorating member in accordance with present invention; and

FIG. 5 is a flow chart illustrating a method of manufacturing an external decorating member in accordance with the present invention.

#### BEST MODE FOR CARRYING OUT THE INVENTION

Reference will now be made in detail to the preferred embodiments of the present invention, examples of which are illustrated in the accompanying drawings.

FIG. 2 is a perspective view illustrating a refrigerator with an external decorating member in accordance with the present invention and FIG. 3 is a fragmentary perspective view illustrating the external decorating member in accordance with the present invention. In addition, FIG. 4 is a cross-sectional view taken along line I-I shown in FIG. 2 and illustrating a refrigerator door with the external decorating member in

- 6 -

accordance with present invention.

As shown in FIG. 2, doors 15 and 15' are respectively provided to a refrigerating chamber 12 and a freezing chamber of a main body 10. Each of the doors 15 and 15' have outer and inner cases 15a and 15b. In the present invention, however, an external decorating member 20 is additionally provided on the front surfaces of the outer case of the doors, which are exposed to a user.

Regarding to FIGs. 3 and 4, the external decorating member 20 includes a glass member 22 with a predetermined size, a first paint layer 24 formed on the surface of the glass member 22, and a second paint layer 26 formed on the first paint layer 24.

The external decorating member 20 will be described in more detail with reference to FIG. 5 illustrating a manufacturing process of the external decorating member 20.

The glass member 22, a plate member attached to the front surface of its corresponding door, makes the first and second paint layers 24 and 26 visible because of the transparent property of itself. Preferably, the glass member 22 has the same size as the front surface of its corresponding door, so as to fully decorate the front surfaces of the doors 15 and 15'. Also, it is preferred that the glass member 22 is made of tempered glass hardened by heat and thus having a high degree of solidity to resist against an external shock.

The first paint layer 24 is formed by coating the glass member 22 with the paint containing certain reflecting materials (S10). In this instance, a spray gun



- 7 -

for spraying the paint containing the reflecting material on the glass member 22 is used to evenly form the first paint layer 22. The first paint layer 24 is sprayed relatively thinly, that is, in the thickness of 5-  
5 20 $\mu$ m (more preferably, in the thickness of 10-15 $\mu$ m), so that the second paint layer which is sprayed after the first paint layer can be shown through the first paint layer 24. The reflecting material of the first paint layer 24 may be made of an inorganic paint or metal  
10 particles and play a role to reflect light. When light enters the first paint layer 24 through the glass member 22, the reflecting material reflects the light.

The first paint layer 24 is spontaneously dried at the room temperature for a predetermined time after  
15 firstly being sprayed (S20).

Then, the paint having a certain color is secondly sprayed on the first paint layer 24 to form the second paint layer 26 (S30). In this instance, similar to a forming stage of the first paint layer 24, the spray gun  
20 is used to spray the pigment on the first paint layer 24. The second paint layer 26, the final paint layer, should be formed with relatively thick, in the range of 5-35 $\mu$ m (more preferably, in the range of 10-30 $\mu$ m), so that it is not peeled off easily. The second paint layer 26 may  
25 have any colors according to its design.

After the second paint layer 24 is completely formed, it is dried for a predetermined time (S40). Unlike the first paint layer 24, however, the second paint layer 26 is artificially dried by heat. This is because that the

- 8 -

second paint layer 26 is not easily adhered to the first paint layer 24 due to its similar property to the first paint layer. The appropriate temperature and time for drying the second paint layer 26(S40) would be 200°C and 10 minutes respectively. Also, it is better for the first and second paint layers 24 and 26 to be made of a heat-resisting ceramic material so as not to be carbonized or discolored when heated.

As previously described, when the first and second paint layers 24 and 26 are sprayed on the glass member 22 in order, the reflecting materials of the first paint layer 24 and the color of the second paint layer 26 are visible simultaneously. Accordingly, the refrigerator has a more elegant image with various colors and a light reflecting effect on the whole surface of it as well as the surface of its doors 15 and 15', compared to the prior art refrigerator having a single color only.

Preferably, a protecting film (not shown) is being covered over the second paint layer 26 of the finished external decorating member 20 (S50), because the second paint layer 26 which is relatively vulnerable to an impact may be scratched on the way of conveyance. In other words, the external decorating member 20 may be conveyed with the protecting film to protect the second paint layer 26, and the protecting film will be detached right before the external decorating member 20 is installed on the refrigerator doors.

Finally, the process of installing the external decorating member 20 on the doors 15 and 15' is performed

- 9 -

(S60). The external decorating member 20 can be installed on the doors 15 and 15' in a way that the second paint layer 26 is exposed, but more preferably, the external decorating member 20 is installed on the doors 15 and 15' in a way that the second paint layer 26 comes in contact with the front surface of its corresponding door (i.e., the surface of the outer case 15a). This is to prevent the second paint layer 26 from being scratched or peeled off when exposed to the outside. Also, the external decorating member 20 can be installed in various ways. For example, two directional adhesive tape or glue can be used to install the external decorating member 20 on the door 15, or a predetermined corporate body may be provided to the door 15 to install the external decorating member 26.

The external decorating member 20 itself has an improved stiffness because of the glass member 22 made of tempered glass and thus plays a role of protecting the doors 15 and 15'.

## 20 INDUSTRIAL APPLICABILITY

As described above, an external decorating member for doors of a refrigerator has the following advantages.

First, the external decorating member of the present invention increases the commercial value of the refrigerator. When the external decorating member of the present invention is attached to the front surfaces of the refrigerator doors, first and second paint layers are exposed through a glass member. Accordingly, various colors and a twinkling effect make the refrigerator look

- 10 -

more elegant. Thus, the refrigerator of the present invention satisfies consumers with their various tastes, resulting in more demand for the product.

Second, The external decorating member 20 itself has  
5 an improved stiffness because of the glass member 22 made of tempered glass and thus protects the refrigerator doors from being easily impaired by an external impact.

While the present invention has been described and illustrated herein with reference to the preferred  
10 embodiment thereof, it will be apparent to those skilled in the art that various modifications and variations can be made therein without departing from the spirit and scope of the invention. Thus, it is intended that the present invention covers the modifications and variations  
15 of this invention that come within the scope of the appended claims and their equivalents.

- 11 -

CLAIMED IS:

1. An external decorating member for doors of a refrigerator, comprising:
  - 5 a glass member;
  - a first paint layer being formed on top of the glass member and having reflecting materials for reflecting light which passed through the glass member;
  - a second paint layer being formed on top of the first
  - 10 paint layer and having a certain color.
2. The external decorating member of claim 1, wherein the glass member is a plate member attached to a front surface of the refrigerator door.
- 15 3. The external decorating member of claim 2, wherein the glass member has the same size as the front surface of its corresponding door.
- 20 4. The external decorating member of claim 1, wherein the glass member has an improved stiffness by being hardened by heat.
5. The external decorating member of claim 1, wherein
- 25 the first paint layer preferably has its thickness in the range of 5-20 $\mu$  .
6. The external decorating member of claim 5, wherein the first paint layer more preferably has its thickness in

- 12 -

the range of 10-15 $\mu$  .

7. The external decorating member of claim 1, wherein the reflecting material of the first paint layer is made  
5 of an inorganic pigment and/or metal particles.

8. The external decorating member of claim 1, wherein the first paint layer is spontaneously dried at the room temperature before the second paint layer is formed.  
10

9. The external decorating member of claim 1, wherein the second paint layer preferably has its thickness in the range of 5-35 $\mu$  .

15 10. The external decorating member of claim 9, wherein the second paint layer more preferably has its thickness in the range of 10-30 $\mu$  .

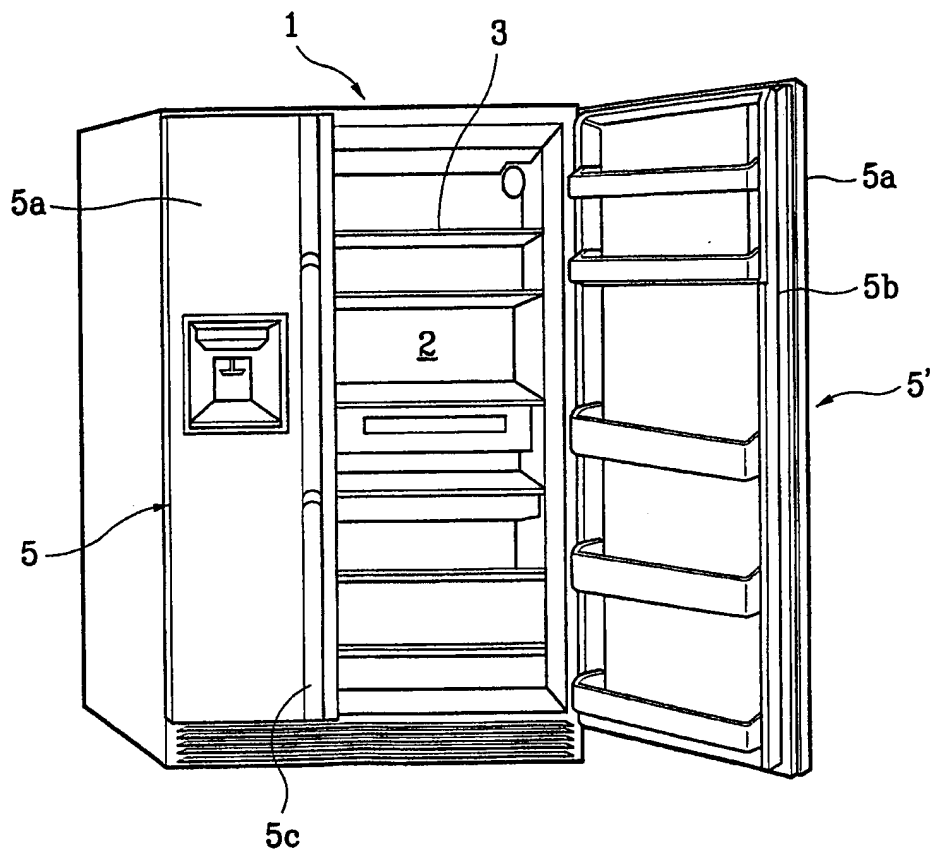
11. The external decorating member of claim 1, wherein  
20 the second paint layer is artificially dried by heat.

12. The external decorating member of claim 1, wherein the first and second paint layers are made of a heat-resisting ceramic pigment.  
25

13. The external decorating member of claim 1, wherein the second paint layer of the external decorating member is provided to the doors so that it comes in contact with the front surface of the refrigerator door.  
30

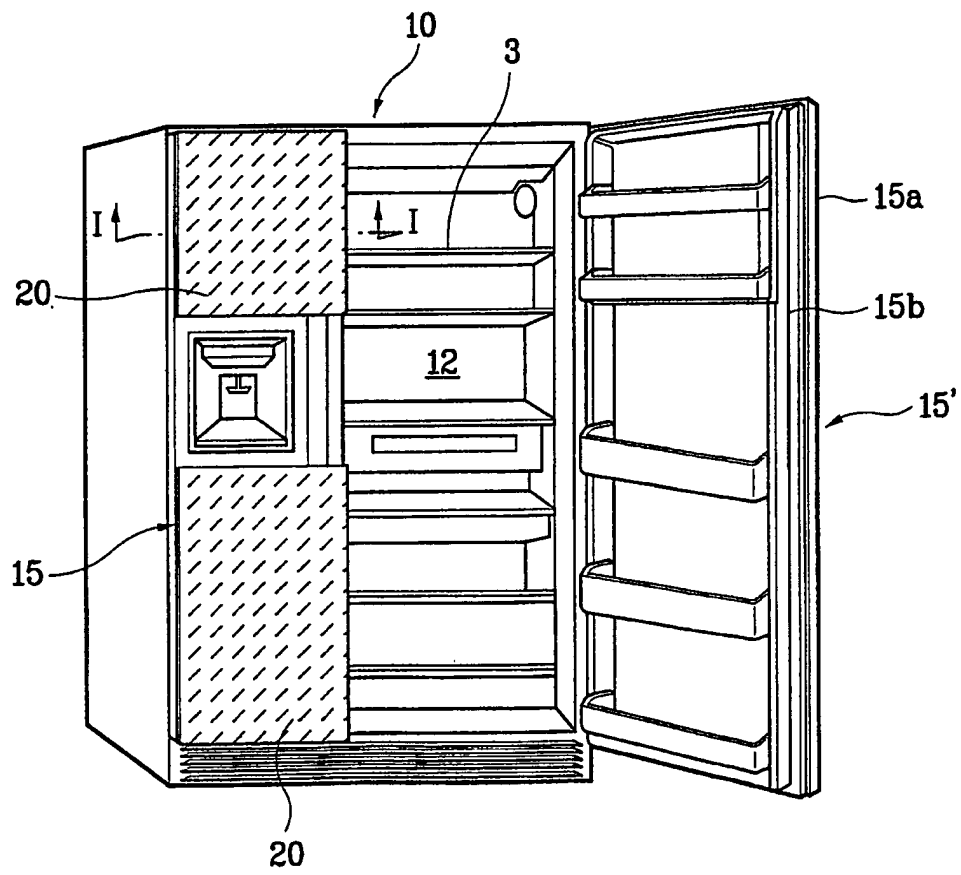
1/5

FIG.1  
Prior Art



2/5

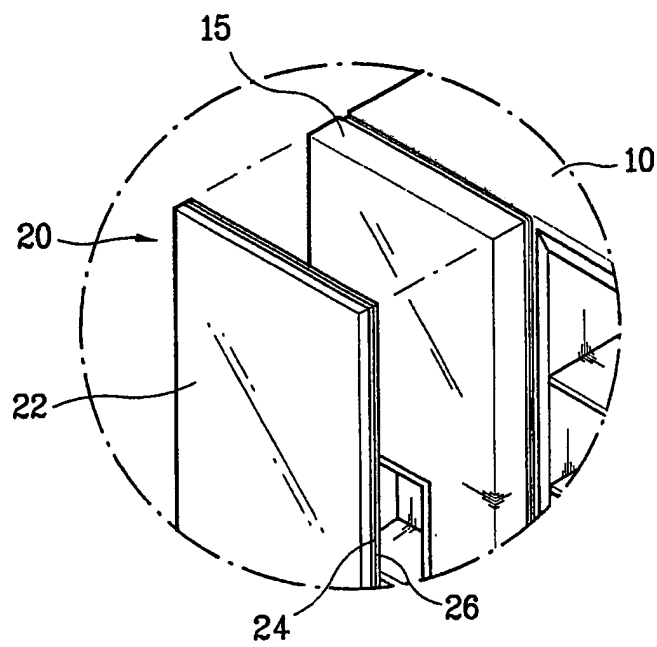
FIG. 2





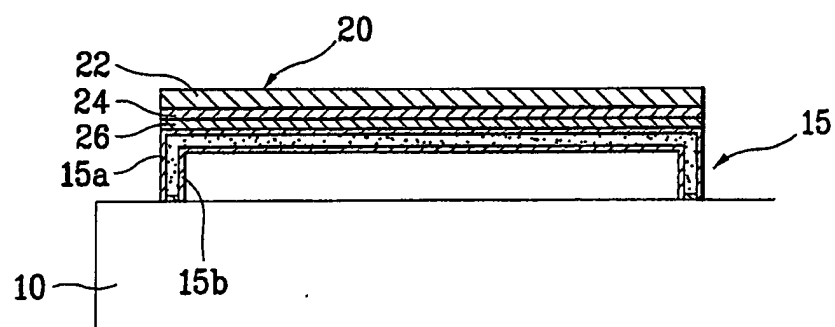
3/5

FIG. 3



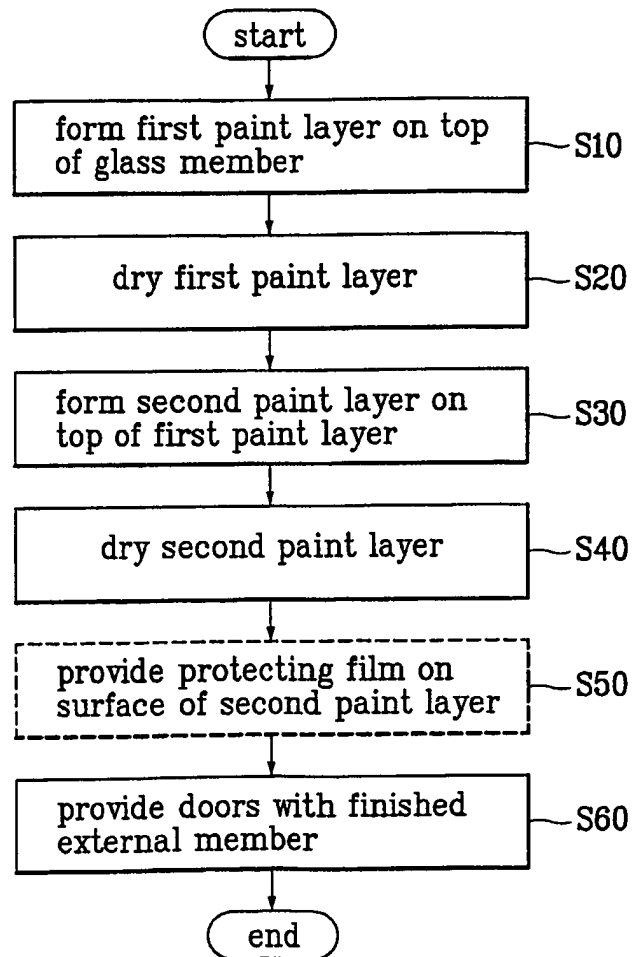
4/5

FIG. 4



5/5

FIG. 5



## INTERNATIONAL SEARCH REPORT

International application No.  
PCT/KR 02/01480

## CLASSIFICATION OF SUBJECT MATTER

IPC<sup>7</sup>: F25D 23/02

According to International Patent Classification (IPC) or to both national classification and IPC

## B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC<sup>7</sup>: F25D, B32B

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

WPI, EPODOC, PAJ

## C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	JP 05 133677 A (MATSUSHITA REFRIG) 28 May 1993 (28.05.93) <i>the whole document.</i>	1-3
A	JP 10 034811 A (KOBEL STEEL) 10 February 1998 (10.02.98) <i>abstract.</i>	1
A	JP 2000 254998 A (KYODO PRINTING) 19 September 2000 (19.09.00) <i>abstract; fig. 1,2.</i>	1

☐ Further documents are listed in the continuation of Box C.☒ See patent family annex.

\* Special categories of cited documents:

„A“ document defining the general state of the art which is not considered to be of particular relevance

„E“ earlier application or patent but published on or after the international filing date

„L“ document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

„O“ document referring to an oral disclosure, use, exhibition or other means

„P“ document published prior to the international filing date but later than the priority date claimed

„T“ later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

„X“ document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

„Y“ document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

„&amp;“ document member of the same patent family

Date of the actual completion of the international search

29 November 2002 (29.11.2002)

Date of mailing of the international search report

20 December 2002 (20.12.2002)

Name and mailing address of the ISA/AT

Austrian Patent Office

Kohlmarkt 8-10; A-1014 Vienna

Facsimile No. 1/53424/535

Authorized officer

WITTMANN K.

Telephone No. 1/53424/380

**INTERNATIONAL SEARCH REPORT**  
Information on patent family members

International application No.  
PCT/KR 02/01480-0

Patent document cited in search report			Publication date	Patent family member(s)		Publication date	
JP	A2	5133677	28-05-1993	DE	C0	69224346	12-03-1998
				DE	T2	69224346	17-09-1998
				EP	A2	541109	12-05-1993
				EP	A3	541109	11-05-1994
				EP	B1	541109	04-02-1998
				JP	B2	3140110	05-03-2001
				US	A	5520453	28-05-1996
				JP	A2	5126461	21-05-1993
				KR	B1	226039	02-03-2000
				JP	B2	3157105	16-04-2001
JP	A2	10034811	10-02-1998				
JP	A2	00254998	19-09-2000			none	